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ABSTRACT

The purpose of this study was to derive a reliable system for classifying the 1,425 responses of over 800 teacher education candidates to a survey regarding adjectives used to describe teacher characteristics. Previous research had indicated five major themes underlying the adjectives teacher candidates think their students will use in describing them: empathic; stimulating; easy to work with; hard working; and expertise. A sixth category was used for words that did not fit into any of the major categories. The 90 most frequently cited adjectives, accounting for 92.5 percent of the responses, were sorted into categories by 17 sorters and results were analyzed for agreement between sorters. Factor analysis showed agreement rates of 89 percent for empathic, 55 percent for expertise, 75 percent for easy to work with, 67 percent for hard working, and 73 percent for stimulating. It is concluded that, while there is some overlap among the sets, low agreement in such areas as "expertise" suggests that caution should be exercised in using these results. (CB)

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Research and Evaluation in Teacher Education

Program Evaluation Series No. 9

SORTING ADJECTIVES DESCRIBING TEACHERS:
AN APPLICATION OF
LATENT PARTITION ANALYSIS

Bruce A. Brousseau

Department of Teacher Education
and
Office of Program Evaluation

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College of Education
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Program Evaluation Series No. 9

SORTING ADJECTIVES DESCRIBING TEACHERS: AN APPLICATION OF LATENT PARTITION ANALYSIS

Bruce A. Brousseau

Sorting Adjectives Describing Teachers: An Application of Latent Partition Analysis

During the period from April 1981 to April 1983 the Office of Program Evaluation (OPE) distributed surveys to over 800 students entering teacher preparation program at Michigan State University. One item on these surveys served as the focus of this study. With some variation in wording from one administration of the questionnaire to the next (see Appendix A), this item asked entering teacher candidates to list adjectives their students will use when describing them as teachers.

At the time this study was undertaken, there was no conceptual framework for classifying responses to this question. The central purpose of the study was to derive a reliable system for classifying these responses. Information provided by the rational and empirical analyses directed toward this goal should serve several functions. First, it will make coding and interpretation of the data easier and quicker than has heretofore been possible. Second, it will give the OPE staff a better indication of whether these items give the most useful information called for by the evaluation model (i.e., relative to other items that could have been added to the survey in their place). The concern here is with gathering as much useful data as possible with a survey of manageable length. The term "useful" is emphasized because in their unanalyzed state the utility of some of these questions cannot be tested, and the OPE may be better off not asking them at all. Third, this study may provide an initial orientation, giving other researchers and evaluators a perspective on concepts and techniques that may be

useful for handling similar kinds of data. Finally, these analyses should provide information that will be helpful in further refinement of the survey instruments. For example, it may indicate that the same (or better) information can be gathered at lower cost, or it may point to other questions not currently being addressed that should be asked. At the very least, it should help the evaluators reflect back on their questions and standardize the instruments used.

Procedure

The results of the "rational" phase of this sorting process were summarized in an OPE report (Brousseau, 1983) which indicated that five major themes underlie the adjectives teacher candidates think their students will use to describe them. These "major categories" are: (1) EMPATHIC (represented by such words as "caring" and "understanding"), (2) STIMULATING (e.g., "enthusiastic", "interesting"), (3) EASY TO WORK WITH (e.g., "flexible" and "cooperative"), (4) HARD WORKING (e.g., "dedicated" and "conscientious"), and (5) EXPERTISE (e.g., "effective" and "knowledgable"). A sixth (OTHER) category was used for words that did not fit into any of the five major categories (these adjectives accounted for less than 2% of all responses given).

The next step was to attempt to establish some empirical support for the classification scheme. The 90 most frequently cited adjectives accounted for 92.5% of the 1,425 responses collected. Thus the five themes should be well represented by this set of terms. These 90 words (or short phrases) were typed on 3 X 5 cards and arranged in alphabetical order. Using these cards, sorters followed the instructions found in Appendix B to divide the terms into categories that might reflect characteristics of teachers. In general terms, these

instructions asked sorters to sort the 90 words into whatever number of categories they deemed appropriate, with words in each category similar in meaning.

Sorters

Eight men and nine women completed the sorting task. Ten of these "sorters" had teaching experience at either the elementary or secondary level (three were currently teaching). Also among this group were five professors from the College of Education and six students who were enrolled in a summer session of TE 200 (an introductory educational psychology course).

Analysis

Using a procedure similar to that introduced by Wiley (1967), the raw 90 X 17 data matrix was converted into a matrix of cross products. The author then used the iterative procedure recommended by Wiley (1967) for latent partition analysis. Because this is the same analysis as that used by Kaiser and Caffrey (1965) for alpha factor analysis, the author was able to use an alpha factor analysis computer program to find solutions for the latent partition analysis problem. Although latent partition analysis and alpha factor analysis are not conceptually equivalent, if the algorithm for alpha factor analysis converges, the algorithm for latent partition analysis will also converge.

With this in mind, the suitable cross-product matrix was created from the raw data and used as the input data in an SPSS alpha factor analysis run.

Results

A plot of the eigenvalues (see Figure 1) indicates that it may have been appropriate to classify the set of 90 "adjectives" into 5 or 6 categories. Matching the output from a 6 factor model (see Appendix C) with the categories derived by Brousseau (1983), a moderate to high degree of overlap is observed. The percentage of agreement between the clusters generated by the factor analysis and the rationally generated categories are presented in Table 1 below:

Table 1

Factor 1	EMPATHIC	89% agreement
Factor 2	EXPERTISE	55% agreement
Factor 3	EASY TO WORK WITH	75% agreement
Factor 4	HARD WORKING	67% agreement
Factor 5	STIMULATING	73% agreement

Discussion

A number of benefits can be gleaned from these results and the techniques used here. First, it is interesting to note the relatively low level of agreement between Factor 2 and the EXPERTISE category. This may indicate that there is less agreement across sorters regarding what it takes to be an "expert" teacher than say an "empathic" teacher. This hypothesis might be tested by repeating the study with the same set of adjectives but a different subject matter (e.g., describe "doctors" or some other professionals rather than teachers).

These results also indicate that the OPE may be able to convert this type of item to a forced choice format on their survey instrument without much loss of information. Using the co-occurence matrix in Appendix D, questionnaire builders could control the variance they want when using similar items by checking for agreement across entries. Intuitively, if none of the sorters place a given pair of words in the same category, it would be safe to assume that the two words are not highly related to the same concept.

Caution should be exercised when using these results. Sorters were instructed to think in terms of the context of teaching when making their classification decisions. Thus, it may not be (indeed we hope it is not) appropriate to use these results to study fields other than teaching. Finally, experts in whatever the field of interest might be should be sought out for the central task of this process (i.e., sorting). This may not solve the problem of low agreement across sorters, but it should reduce discrepancies.

References

Brousseau, B. A. (1983). Adjectives describing you as a teacher. Unpublished report, Michigan State University, College of Education Office of Program Evaluation.

Kaiser, H. F. and Caffrey, J. (1965). Alpha factor analysis. Psychometrika, 30, 1-14.

Wiley, D. E. (1967). Latent partition analysis. Psychometrika, 9, 183-193.

Appendix A

(A) From the "ED 101A Student Survey" (version 1) used Spring 1981, items 31a and 31b:

31. (a) Name two or three adjectives that you think others will be likely to use in describing you as a teacher.

(b) What one word do you think will provide the best description of your approach to teaching?

(B) From the "College of Education Survey of Entering Students" (version 2) used Fall 1981 and Winter 1982, items 31a and 31b:

31. (a) Name three adjectives that you think others will be likely to use in describing you as a teacher.

(b) What one word do you think will provide the best description of your approach to teaching?

(C) From the "Entering Teacher Candidate Survey" (version 4) used Fall 1982, Winter 1983, and Spring 1983, item 9:

9. Name three adjectives you feel will best describe you as a teacher.

Appendix B

sorting instructions

In a survey completed last year, TE 200 students were asked to give three "adjectives" that **they felt would best describe themselves as teachers.** Since the respondents did not restrict themselves to just adjectives in all cases, I will hereafter refer to these **descriptors** simply as words. Your mission, should you decide to accept it, is to sort the ninety (90) most frequently used words into separate categories. The words you place in the same category should be similar in meaning. You may use any number of categories and have any number of words within each category.

The following procedure should be used as a guide. Examine the first word and determine what you think it means in the context of the survey question. Study the second word in the same fashion. If you decide that the first and second words have "almost the same meaning," in the context of the survey question, place them together in the same category, otherwise, form a new category with that word. Review subsequent words in the same fashion. In each case decide what the word means, and so which category it belongs to. In the beginning, you will probably tend to form a new category with each item, but as you progress through the words, you should begin to make use of already-formed categories.

A certain amount of judgment will be involved in deciding what is meant by two words having "almost the same meaning." For example, some words may seem to be positive and others negative, or some may seem to be related to personality traits while others are more general. Remember **your judgments should reflect differences that you think could be used to describe teachers.**

After all of the words have been sorted, review all of the categories which have been formed. Check to see if all of the words within a category are (to your satisfaction) similar in meaning. When they are not, sort inappropriate items into new categories or into other already-formed categories. When you are satisfied with these groupings, give each category a title that you feel is an accurate descriptions of what the corresponding words mean. If necessary, review the words in each category again to make sure that your final statements are clear descriptions of the categories into which these words fall. Number your categories and write the corresponding category labels in the space below.

Appendix C

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
SENSY TO OTHERS	81632					
COMPASSIONATE	80490					
CARING	78366					
CONCERNED	77468		34844			
UNDERSTADING	77431					
AFFECTIONATE	77153					
EMPATHETIC	75863		35753			
SENSITIVE	74088					
LOVING	69980					
HELPFUL	67282		38169			
SUPPORTIVE	67191					
INTEREST /CHILD	66360					
LOVE F/CHILDREN	66039					
AFFECTIVE	62474					
WARM	59936					
APPROACHABLE	59138		54813			
GOOD W/STUDENTS	55500					35985
ENCOURAGING	54547					
KIND	54275					
OPEN	51032		58715			
ATTENTIVE	50936					
OPENNESS	48897					49352
						45401

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
CAPABLE		80587				
EFFICIENT		79439				
COMPETENT		79361				
QUALIFIED		75716				
RESPONSIBLE		74817				
ORGANIZED		72412				
DEPENDABLE		71378				
EFFECTIVE		70479				
WELL ORGANIZED		63040				
CONSCIENTIOUS		62831				
DISCIPLINED		61131				
INTELLIGENT		59010				
HARDWORKING		56548				
KNOWLEDGABLE		54571				
CONFIDENT		53841				
DEDICATED		50918				
RESPECTABLE		50254			36887	
DEVOTED		48589				
INFORMATIVE		46461				
INVOLVED		40596				36356
GOAL ORIENTED		38380			37170	
RESOURCEFUL		38306				

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
CHEERFULL			81459			
PLEASANT			78735			
NICE			78518			
HAPPY			78184			
FRIENDLY	44091		69079		31020	
HUMOROUS			68838			
LIKEABLE	43827		63286			
EASY GOING			59814			
PERSONABLE	48492		59462			
SINCERE	34399		58827			
FUN			57164			
KIND	54275		56715			
FLEXIBLE			55219			
CALM			54059			34458
PERSONAL	30861		51898			
HONEST			51734			
LIBERAL			47328			
GOOD			41338			36278
POSITIVE			41172			
PATIENT			32816			

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
STRICT STANDARD				1 00194		
TOUGH				95803		
FIRM				86084		
DEMANDING				84254		
CHALLENGING				73920	30845	
PERSISTENT				64881		
MOTIVATOR				47791	39276	34026
STIMULATING				45087	38217	41075
MOTIVATING				41224	34884	

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
ENTHUSIASTIC					72288	
ENERGETIC					71525	
ACTIVE					68973	
OUTGOING			35484		62043	
EXCITING					61447	
AMBITIOUS					61146	
MOTIVATED		38097			58583	
DETERMINED		31758			48785	
INTERESTING					44098	
INTERESTED	34209				35810	
CREATIVE					30819	

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
OPENMINDED	34844		35087			
OBJECTIVE				31081		82318
FACILITATOR	34012					50858
FAIR			31887			34982
						34298

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 ACTIVE	1000	117	058	470	0	117	235	0	117	176	294	117	0	0	176	0	176	294	176	0	0	235	058	058
2 AFFECTIONATE		1000	588	058	529	294	235	0	882	0	352	764	0	588	0	0	117	117	058	0	058	058	117	058
3 AFFECTIVE			1000	0	529	470	176	176	529	058	176	588	117	411	117	117	117	058	058	058	117	0	235	058
4 AMBITIOUS				1000	0	0	058	235	058	411	176	058	235	058	352	352	117	176	470	176	176	705	294	411
5 APPROACHABLE					1000	411	176	117	588	058	235	470	058	470	117	058	176	0	0	058	058	0	117	0
6 ATTENTIVE						1000	235	058	352	058	176	470	058	470	058	176	411	058	176	058	117	058	294	058
7 CALM							1000	0	176	117	411	235	058	058	058	058	117	176	058	117	058	058	058	235
8 CAPABLE								1000	0	235	058	0	941	117	529	470	176	117	294	235	529	235	294	470
9 CARING									1000	0	352	764	0	588	0	0	117	117	058	0	058	058	058	058
10 CHALLENGING										1000	117	0	294	117	352	352	176	058	235	764	235	352	176	352
11 CHEERFULLNG											1000	235	058	176	176	058	235	235	117	058	176	176	058	117
12 COMPASSIONATE												1000	0	588	0	0	117	117	058	0	058	058	117	058
13 COMPETENT													1000	117	470	529	176	117	294	294	529	235	294	529
14 CONCERENED														1000	117	176	352	058	176	117	235	058	352	058
15 CONFIDENT															1000	470	176	117	294	235	470	352	294	352
16 CONSCIENTIOUS																1000	235	117	588	294	529	294	529	647
17 COOPERATIVE																	1000	117	176	176	411	117	235	117
18 CREATIVE																		1000	176	058	117	117	117	176
19 DEDICATED																			1000	176	352	529	764	529
20 DEMANDING																				1000	235	294	235	294
21 DEPENDABLE																					1000	176	352	411
22 DETERMINED																						1000	470	352
23 DEVOTED																							1000	352
24 DISCIPLINED																								1000
25 EASY GOING																								
26 EFFECTIVE																								
27 EFFICIENT																								
28 EMPATHIC																								
29 ENCOURAGING																								
30 ENERGETIC																								
31 ENTHUSIASTIC																								
32 EXCITING																								
33 FACILITATOR																								
34 FAIR																								
35 FIRM																								
36 FLEXIBLE																								
37 FRIENDLY																								
38 FUN																								
39 GOAL ORIENTED																								
40 GOOD																								
41 GOOD WITH STUDENTS																								
42 HAPPY																								
43 HARDWORKING																								
44 HELPFUL																								
45 HONEST																								
46 HUMOROUS																								
47 IMAGINATIVE																								
48 INFORMATIVE																								
49 INNOVATIVE																								
50 INTELLIGENT																								

Appendix D (cont.)

51 INTERESTED IN CHILD
52 INTERESTED
53 INTERESTING
54 INVOLVED
55 KIND
56 KNOWLEDGABLE
57 LIBERAL
58 LIKABLE
59 LOVE FOR CHILDREN
60 LOVING
61 MOTIVATED
62 MOTIVATOR
63 MOTIVATING
64 NICE
65 OBJECTIVE
66 OPEN
67 OPENMINDED
68 OPENNESS
69 ORGANIZED
70 OUTGOING
71 PATIENT
72 PERSISTENT
73 PERSONABLE
74 PERSONAL
75 PLEASANT
76 POSITIVE
77 QUALIFIED
78 RESOURCEFUL
79 RESPECTABLE
80 RESPONSIBLE
81 SENSITIVE
82 SENSITIVE TO OTHERS
83 SINCERE
84 STIMULATING
85 STRICT STANDARD
86 SUPPORTIVE
87 TOUGH
88 UNDERSTANDING
89 WARM
90 WELL-ORGANIZED

Appendix D

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 ACTIVE	1000	117	058	470	0	117	235	0	117	176	294	117	0	0	176	0	176	294	176	0	0	235	058	058
2 AFFECTIONATE		1000	588	058	529	294	235	0	882	0	352	764	0	588	0	0	117	117	058	0	058	058	117	058
3 AFFECTIVE			1000	0	529	470	176	176	529	058	176	588	117	411	117	117	117	058	058	058	117	0	235	058
4 AMBITIOUS				1000	0	0	058	235	058	411	176	058	235	058	352	352	117	176	470	176	176	705	294	411
5 APPROACHABLE					1000	411	176	117	588	058	235	470	058	470	117	058	176	0	0	058	058	0	117	0
6 ATTENTIVE						1000	235	058	352	058	176	470	058	470	058	176	411	058	176	058	117	058	294	058
7 CALM							1000	0	176	117	411	235	058	058	058	058	117	176	058	117	058	058	058	235
8 CAPABLE								1000	0	235	058	0	941	117	529	470	176	117	294	235	529	235	294	470
9 CARING									1000	0	352	764	0	588	0	0	117	117	058	0	058	058	058	058
10 CHALLENGING										1000	117	0	294	117	352	352	176	058	235	764	235	352	176	352
11 CHEERFULLNG											1000	235	058	176	176	058	235	235	117	058	176	176	058	117
12 COMPASSIONATE												1000	0	588	0	0	117	117	058	0	058	058	117	058
13 COMPETENT													1000	117	470	529	176	117	294	294	529	235	294	529
14 CONCERENED														1000	117	176	352	058	176	117	235	058	352	058
15 CONFIDENT															1000	470	176	117	294	235	470	352	294	352
16 CONSCIENTIOUS																1000	235	117	588	294	529	294	529	647
17 COOPERATIVE																	1000	117	176	176	411	117	235	117
18 CREATIVE																		1000	176	058	117	117	117	176
19 DEDICATED																			1000	176	352	529	764	529
20 DEMANDING																				1000	235	294	235	294
21 DEPENDABLE																					1000	176	352	411
22 DETERMINED																						1000	470	352
23 DEVOTED																							1000	352
24 DISCIPLINED																								1000
25 EASY GOING																								
26 EFFECTIVE																								
27 EFFICIENT																								
28 EMPATHIC																								
29 ENCOURAGING																								
30 ENERGETIC																								
31 ENTHUSIASTIC																								
32 EXCITING																								
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45 HONEST																								
46 HUMOROUS																								
47 IMAGINATIVE																								
48 INFORMATIVE																								
49 INNOVATIVE																								
50 INTELLIGENT																								

51 INTERESTED IN CHILD
52 INTERESTED
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54 INVOLVED
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56 KNOWLEDGABLE
57 LIBERAL
58 LIKABLE
59 LOVE FOR CHILDREN
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61 MOTIVATED
62 MOTIVATOR
63 MOTIVATING
64 NICE
65 OBJECTIVE
66 OPEN
67 OPENMINDED
68 OPENNESS
69 ORGANIZED
70 OUTGOING
71 PATIENT
72 PERSISTENT
73 PERSONABLE
74 PERSONAL
75 PLEASANT
76 POSITIVE
77 QUALIFIED
78 RESOURCEFUL
79 RESPECTABLE
80 RESPONSIBLE
81 SENSITIVE
82 SENSITIVE TO OTHERS
83 SINCERE
84 STIMULATING
85 STRICT STANDARD
86 SUPPORTIVE
87 TOUGH
88 UNDERSTANDING
89 WARM
90 WELL-ORGANIZED

Appendix D (cont.)

	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1	176	058	058	058	117	705	823	470	058	117	0	294	176	352	176	176	058	352	176	058	176	352	235	0
2	235	0	0	647	470	117	117	117	235	176	058	176	588	294	0	176	411	352	058	529	294	470	058	0
3	117	235	117	705	470	058	058	058	352	117	117	058	352	235	058	117	235	176	058	411	176	235	0	117
4	058	117	176	0	117	588	411	352	058	0	058	058	058	058	588	058	117	176	470	0	0	058	176	117
5	235	117	058	588	529	0	0	0	352	352	176	176	529	235	058	117	235	235	0	411	352	235	0	117
6	294	117	117	529	235	117	117	176	294	176	058	235	352	176	117	117	176	176	058	294	235	176	058	117
7	529	0	0	176	0	176	235	235	176	176	176	529	352	235	058	235	058	352	176	0	235	294	176	176
8	058	823	705	117	176	117	058	058	176	117	117	0	0	117	294	411	117	058	352	117	117	0	117	352
9	235	0	0	647	470	117	117	117	235	235	058	176	588	294	0	176	411	352	058	529	352	411	058	0
10	058	176	176	058	235	235	176	294	176	117	529	0	0	0	411	0	058	117	176	058	058	0	058	235
11	411	0	0	117	058	352	352	294	0	235	0	411	647	470	0	294	176	941	176	117	352	588	117	0
12	235	0	0	823	411	117	117	117	235	117	058	235	529	235	0	176	411	235	058	470	294	294	058	0
13	117	764	705	058	117	117	058	058	117	117	176	0	0	058	294	352	117	058	352	117	117	0	117	294
14	058	058	058	588	470	058	058	0	294	176	117	058	294	058	058	0	411	176	058	588	176	117	0	058
15	058	470	411	117	176	176	176	176	176	117	176	058	0	117	352	235	117	117	176	058	176	058	117	294
16	058	411	470	058	117	117	058	117	117	058	176	0	0	0	411	117	058	058	352	058	058	0	117	235
17	058	117	176	117	117	176	235	058	235	294	058	235	235	117	117	058	352	235	235	294	294	176	117	117
18	117	058	058	058	058	235	352	235	058	058	0	176	117	294	0	235	117	235	235	0	117	235	882	117
19	058	235	352	0	058	294	235	176	058	0	058	058	058	058	352	117	117	117	529	0	0	058	176	176
20	117	176	176	058	176	117	058	117	235	117	647	0	0	058	235	0	058	058	117	058	058	058	058	235
21	058	470	588	058	117	117	058	058	117	176	117	117	058	0	176	117	235	117	411	235	235	058	117	294
22	058	117	235	0	117	411	294	235	058	0	176	058	058	058	588	058	117	176	470	0	0	058	117	117
23	058	235	352	176	058	117	117	0	176	058	117	0	058	0	294	058	117	058	411	117	058	0	117	176
24	117	411	470	0	058	235	117	176	117	0	176	058	058	058	352	176	117	117	588	058	0	058	176	294
25	000	058	058	176	0	235	176	294	117	117	058	470	470	411	0	294	117	352	058	058	235	352	117	058
26		1000	705	117	176	058	0	058	176	117	117	058	0	117	294	411	058	0	235	176	117	0	117	352
27			1000	058	117	058	0	058	117	117	117	058	0	058	411	176	117	0	470	235	117	0	117	294
28				1000	529	058	058	058	352	117	117	117	411	235	058	117	294	117	0	470	235	176	0	117
29					1000	117	117	176	352	176	235	0	235	176	176	058	235	058	0	588	176	117	058	176
30						1000	764	588	058	058	058	176	235	294	176	176	117	411	235	0	117	294	117	058
31							1000	529	058	117	0	235	176	411	058	176	117	411	235	0	176	411	235	0
32								1000	058	058	058	176	235	411	176	235	058	352	117	0	117	411	235	117
33									1000	176	176	117	117	058	176	117	176	0	058	352	058	0	176	411
34										1000	352	294	235	235	117	176	176	235	058	176	705	294	058	176
35											1000	058	058	058	176	0	058	0	0	117	176	058	0	235
36												1000	352	235	117	176	117	352	117	117	352	294	117	058
37													1000	411	0	235	235	647	058	294	352	529	058	0
38														1000	0	352	058	529	117	058	294	823	235	058
39															1000	058	0	0	352	117	058	0	058	235
40																1000	117	294	176	0	352	294	235	176
41																	1000	176	176	470	117	117	058	0
42																		1000	176	117	294	647	117	0
43																			1000	117	058	117	235	176
44																				1000	117	117	0	117
45																					1000	352	058	058
46																						1000	176	0
47																							1000	235
48																								1000
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Appendix D (cont.)

	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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3	117	117	411	176	0	176	411	117	176	235	411	470	0	117	117	235	117	294	294	352	117	176	294	117
4	117	176	117	294	176	294	058	176	058	117	117	058	823	176	176	058	058	117	058	058	117	294	0	470
5	117	117	294	294	058	117	352	117	294	352	294	411	0	176	117	411	294	529	470	470	058	176	294	117
6	058	058	294	352	117	235	352	058	235	352	176	411	058	0	117	294	176	470	411	352	117	235	294	058
7	0	058	058	0	235	058	294	058	470	235	117	235	058	176	0	411	117	235	352	235	058	176	470	176
8	294	588	058	235	058	294	0	529	058	058	058	0	235	117	176	0	176	117	058	058	529	058	058	235
9	0	0	470	235	058	176	705	0	117	529	470	764	058	117	0	529	058	294	235	470	0	235	294	058
10	176	294	058	294	176	176	0	294	0	058	058	0	411	411	411	0	176	058	0	0	176	176	058	647
11	0	058	235	117	176	176	470	058	352	705	235	352	176	058	0	705	058	235	235	235	0	470	235	0
12	0	0	470	235	058	176	705	0	117	470	529	764	058	117	0	470	0	411	352	411	0	235	411	058
13	235	529	058	235	058	294	0	470	0	058	058	0	235	058	176	0	117	058	0	0	529	058	058	294
14	058	117	470	411	058	176	470	117	0	411	529	588	058	058	117	235	117	411	235	352	058	176	176	058
15	294	411	058	294	117	176	0	352	117	058	058	0	352	117	176	0	176	117	117	117	411	176	117	235
16	235	294	117	235	058	294	0	294	0	058	058	0	411	058	176	0	176	058	0	0	411	058	058	352
17	117	176	294	411	058	176	235	176	176	235	235	117	117	058	058	176	176	294	176	117	117	176	294	117
18	705	117	117	117	294	235	176	176	117	176	117	117	117	117	176	176	0	117	058	117	058	294	117	0
19	176	235	176	176	117	529	058	235	058	117	117	058	647	117	117	058	058	117	058	058	294	117	0	294
20	176	294	058	235	176	176	0	294	058	058	117	0	176	411	352	0	235	058	0	0	176	117	058	529
21	235	411	117	235	058	294	058	352	058	117	117	058	235	058	176	058	117	058	058	058	529	058	176	176
22	117	176	117	235	117	470	058	176	058	117	117	058	705	235	176	058	117	117	058	058	176	235	0	411
23	176	235	176	176	0	470	058	235	0	117	176	117	411	0	117	0	117	117	058	058	294	117	058	235
24	176	352	176	176	176	470	058	352	058	117	117	058	470	176	117	058	058	117	058	058	470	117	0	411
25	0	058	117	0	176	117	294	058	470	411	176	352	058	058	0	411	058	352	411	294	0	294	235	117
26	352	470	058	176	058	235	0	411	058	0	0	0	117	117	294	058	235	058	058	117	588	0	058	176
27	294	411	0	176	058	294	0	352	0	0	0	0	294	058	235	0	176	0	0	058	764	0	058	235
28	117	117	352	294	0	117	529	117	117	352	411	588	0	117	058	352	117	411	352	411	058	176	352	117
29	235	176	294	352	235	117	411	176	058	176	294	411	117	352	411	176	235	294	235	294	117	117	235	235
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35	117	176	058	117	176	0	058	176	0	0	058	0	058	411	294	058	411	058	176	0	176	0	176	411
36	058	0	117	058	117	058	294	0	588	294	117	176	058	176	117	411	235	352	470	352	117	176	470	0
37	0	0	294	117	117	176	588	0	294	764	294	529	058	117	0	823	058	411	352	294	0	411	235	058
38	176	117	117	176	352	117	470	117	294	411	176	294	058	294	117	470	117	176	235	176	0	470	176	117
39	235	176	0	235	058	294	0	176	0	0	0	0	588	235	294	0	235	0	058	058	470	058	117	529
40	117	235	058	0	117	117	352	176	235	235	058	352	058	117	058	352	058	117	117	176	176	176	176	0
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43	117	235	117	117	058	470	117	235	117	117	117	058	529	058	0	117	0	117	058	058	352	117	058	294
44	117	117	470	176	117	176	352	117	0	235	470	470	0	058	235	117	176	235	176	294	176	117	235	058
45	058	117	058	176	058	0	470	058	235	294	058	294	0	058	117	411	411	235	294	352	117	117	470	117
46	058	0	176	176	352	117	529	0	294	470	235	352	058	235	117	588	058	117	176	117	0	470	235	117
47	764	117	058	117	352	235	117	176	176	058	058	117	117	117	176	117	0	058	058	058	117	176	058	058
48	352	705	0	235	235	176	0	823	117	0	0	058	117	235	117	0	294	058	117	058	411	0	117	235
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50		1000	058	294	176	235	0	882	058	058	058	0	176	176	176	0	235	117	058	058	411	058	058	235

	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
51			1000	235	117	294	294	058	058	352	882	411	117	117	117	176	058	294	176	176	0	235	235	0
52				1000	294	235	176	294	058	235	176	235	235	235	294	176	176	235	117	235	176	411	235	235
53					1000	058	117	176	176	176	117	117	117	411	411	117	176	176	176	058	058	352	0	117
54						1000	117	235	058	235	235	176	411	176	176	117	0	176	117	117	235	294	0	176
55							1000	0	176	588	352	823	058	117	0	647	058	294	235	294	0	294	352	058
56								1000	058	058	058	0	176	176	117	0	235	117	058	058	352	058	058	235
57									1000	176	117	117	058	176	058	352	176	411	470	294	0	117	235	058
58										1000	352	588	117	058	0	705	058	411	235	294	0	470	117	0
59											1000	470	117	117	058	176	058	294	176	176	0	235	176	058
60												1000	058	058	0	470	0	294	176	411	0	294	294	0
61													1000	176	117	058	058	117	058	058	235	235	0	470
62														1000	588	117	235	176	294	117	117	352	117	352
63															1000	0	235	058	058	058	235	235	058	294
64																1000	058	294	294	235	0	352	294	058
65																	1000	352	411	352	235	058	176	117
66																		1000	823	647	0	235	117	0
67																			1000	647	058	176	294	058
68																				1000	058	176	235	0
69																					1000	0	117	176
70																						1000	058	058
71																							1000	117
72																								1000
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Appendix D (cont.)

	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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52				1000	294	235	176	294	058	235	176	235	235	235	294	176	176	235	117	235	176	411	235	235
53					1000	058	117	176	176	176	117	117	117	411	411	117	176	176	176	058	058	352	0	117
54						1000	117	235	058	235	235	176	411	176	176	117	0	176	117	117	235	294	0	176
55							1000	0	176	588	352	823	058	117	0	647	058	294	235	294	0	294	352	058
56								1000	058	058	058	0	176	176	117	0	235	117	058	058	352	058	058	235
57									1000	176	117	117	058	176	058	352	176	411	470	294	0	117	235	058
58										1000	352	588	117	058	0	705	058	411	235	294	0	470	117	0
59											1000	470	117	117	058	176	058	294	176	176	0	235	176	058
60												1000	058	058	0	470	0	294	176	411	0	294	294	0
61													1000	176	117	058	058	117	058	058	235	235	0	470
62														1000	588	117	235	176	294	117	117	352	117	352
63															1000	0	235	058	058	058	235	235	058	294
64																1000	058	294	294	235	0	352	294	058
65																	1000	352	411	352	235	058	176	117
66																		1000	823	647	0	235	117	0
67																			1000	647	058	176	294	058
68																				1000	058	176	235	0
69																					1000	0	117	176
70																						1000	058	058
71																							1000	117
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	49	50	51	52	53	54	55	56	57	58	59			62	63	64	65	66	67	68	69	70	71	72
1	117	0	058	294	294	235	235	0	176	176	058	11		235	294	235	117	117	117	176	058	529	117	176
2	0	0	470	176	058	176	705	0	117	470	529	764	058	117	0	470	0	294	235	411	0	235	294	058
3	117	117	411	176	0	176	411	117	176	235	411	470	0	117	117	235	117	294	294	352	117	176	294	117
4	117	176	117	294	176	294	058	176	058	117	117	058	823	176	176	058	058	117	058	058	117	294	0	470
5	117	117	294	294	058	117	352	117	294	352	294	411	0	176	117	411	294	529	470	470	058	176	294	117
6	058	058	294	352	117	235	352	058	235	352	176	411	058	0	117	294	176	470	411	352	117	235	294	058
7	0	058	058	0	235	058	294	058	470	235	117	235	058	176	0	411	117	235	352	235	058	176	470	176
8	294	588	058	235	058	294	0	529	058	058	058	0	235	117	176	0	176	117	058	058	529	058	058	235
9	0	0	470	235	058	176	705	0	117	529	470	764	058	117	0	529	058	294	235	470	0	235	294	058
10	176	294	058	294	176	176	0	294	0	058	058	0	411	411	411	0	176	058	0	0	176	176	058	647
11	0	058	235	117	176	176	470	058	352	705	235	352	176	058	0	705	058	235	235	235	0	470	235	0
12	0	0	470	235	058	176	705	0	117	470	529	764	058	117	0	470	0	411	352	411	0	235	411	058
13	235	529	058	235	058	294	0	470	0	058	058	0	235	058	176	0	117	058	0	0	529	058	058	294
14	058	117	470	411	058	176	470	117	0	411	529	588	058	058	117	235	117	411	235	352	058	176	176	058
15	294	411	058	294	117	176	0	352	117	058	058	0	352	117	176	0	176	117	117	117	411	176	117	235
16	235	294	117	235	058	294	0	294	0	058	058	0	411	058	176	0	176	058	0	0	411	058	058	352
17	117	176	294	411	058	176	235	176	176	235	235	117	117	058	058	176	176	294	176	117	117	176	294	117
18	705	117	117	117	294	235	176	176	117	176	117	117	117	117	176	176	0	117	058	117	058	294	117	0
19	176	235	176	176	117	529	058	235	058	117	117	058	647	117	117	058	058	117	058	058	294	117	0	294
20	176	294	058	235	176	176	0	294	058	058	117	0	176	411	352	0	235	058	0	0	176	117	058	529
21	235	411	117	235	058	294	058	352	058	117	117	058	235	058	176	058	117	058	058	058	529	058	176	176
22	117	176	117	235	117	470	058	176	058	117	117	058	705	235	176	058	117	117	058	058	176	235	0	411
23	176	235	176	176	0	470	058	235	0	117	176	117	411	0	117	0	117	117	058	058	294	117	058	235
24	176	352	176	176	176	470	058	352	058	117	117	058	470	176	117	058	058	117	058	058	470	117	0	411
25	0	058	117	0	176	117	294	058	470	411	176	352	058	058	0	411	058	352	411	294	0	294	235	117
26	352	470	058	176	058	235	0	411	058	0	0	0	117	117	294	058	235	058	058	117	588	0	058	176
27	294	411	0	176	058	294	0	352	0	0	0	0	294	058	235	0	176	0	0	058	764	0	058	235
28	117	117	352	294	0	117	529	117	117	352	411	588	0	117	058	352	117	411	352	411	058	176	352	117
29	235	176	294	352	235	117	411	176	058	176	294	411	117	352	411	176	235	294	235	294	117	117	235	235
30	058	117	117	352	294	294	235	117	117	294	117	176	529	294	235	235	117	176	117	117	058	588	058	176
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35	117	176	058	117	176	0	058	176	0	0	058	0	058	411	294	058	411	058	176	0	176	0	176	411
36	058	0	117	058	117	058	294	0	588	294	117	176	058	176	117	411	235	352	470	352	117	176	470	0
37	0	0	294	117	117	176	588	0	294	764	294	529	058	117	0	823	058	411	352	294	0	411	235	058
38	176	117	117	176	352	117	470	117	294	411	176	294	058	294	117	470	117	176	235	176	0	470	176	117
39	235	176	0	235	058	294	0	176	0	0	0	0	588	235	294	0	235	0	058	058	470	058	117	529
40	117	235	058	0	117	117	352	176	235	235	058	352	058	117	058	352	058	117	117	176	176	176	176	0
41	0	117	823	176	117	176	235	058	058	294	764	352	117	117	117	117	058	294	176	176	058	176	235	0
42	0	058	235	176	235	176	470	058	294	705	235	352	176	117	058	705	058	235	176	176	0	529	176	0
43	117	235	117	117	058	470	117	235	117	117	117	058	529	058	0	117	0	117	058	058	352	117	058	294
44	117	117	470	176	117	176	352	117	0	235	470	470	0	058	235	117	176	235	176	294	176	117	235	058
45	058	117	058	176	058	0	470	058	235	294	058	294	0	058	117	411	411	235	294	352	117	117	470	117
46	058	0	176	176	352	117	529	0	294	470	235	352	058	235	117	588	058	117	176	117	0	470	235	117
47	764	117	058	117	352	235	117	176	176	058	058	117	117	117	176	117	0	058	058	058	117	176	058	058
48	352	705	0	235	235	176	0	823	117	0	0	058	117	235	117	0	294	058	117	058	411	0	117	235
49	1000	294	0	176	235	176	0	352	058	0	0	0	117	176	294	0	235	058	058	117	294	058	058	176
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Appendix D (cont.)

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2	588	411	352	352	0	058	058	0	647	647	470	058	058	529	117	705	764	117
3	294	470	117	294	117	058	117	117	588	470	235	176	176	470	235	529	529	117
4	058	0	117	117	176	176	058	176	117	117	058	117	058	117	058	058	058	176
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Appendix D (cont.)

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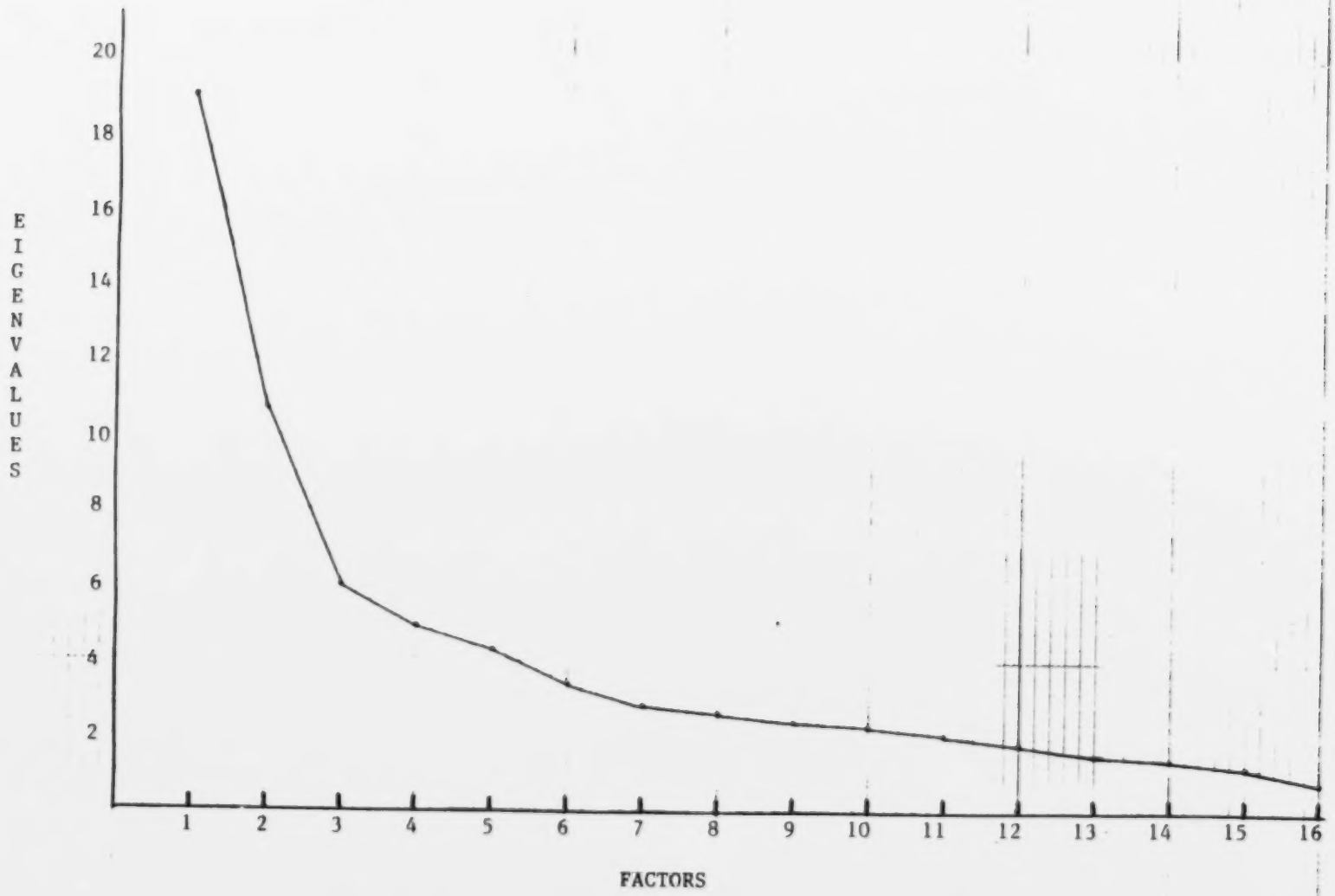
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FACTORS

Figure 1